

## 11.—History of the Rottnest Biological Station

The Rottnest Biological Station had its origin in a visit that Professor Waring and I paid to the Island in May, 1948, shortly after he arrived in W.A. on first appointment. He at once recognised the potentialities of the Island for biological studies and especially the research asset represented by the large quokka population. We talked then about the possibility of establishing a field station. The Island had been the scene of active biological study before, as evidenced by the Bibliography, and there had been student camps under Professor G. E. Nicholls. The last of these, in November, 1945, was my first introduction to Rottnest. On that occasion we used two bungalows in the settlement, both as living accommodation and as laboratories. I vividly remember the untidy array of microscopes and other apparatus that cluttered the kitchen table, the smelly collections of marine animals we examined, and the happy friendly relations between students and staff.

Physiological research on the quokka started almost immediately in the Zoology Department and another student camp was held in 1951. However no further action was taken to establish a field station until 1953. In this year Dr. K. Sheard undertook successful personal negotiations with the Naval Officer-in-Charge, W.A. for the lease of the naval barracks and signal station near the central lighthouse. In September the Navy agreed to lease the buildings to the State Department of Fisheries at a nominal rental. This was finalised by the Department of the Interior and a ten year lease commenced on 21st December at an annual rental of £1.

A committee of management, the Rottnest Biological Station Committee, was set up under the Chairmanship of Mr. A. J. Fraser, Superintendent of Fisheries for Western Australia. This held its first meeting on 11th January, 1954. The other members at that time were the Hon. Mr. L. F. Kelly, M.L.A., Minister for Fisheries and Chairman of the Rottnest Island Board with Dr. K. Sheard of the C.S.I.R.O. Division of Fisheries, Professor H. Waring representing the University, and Mr. B. K. Bowen of the Fisheries Department as Secretary. Subsequently Dr. J. M. Dunnet, of C.S.I.R.O. Wildlife Survey Section, joined the Committee (October, 1955 to July, 1956), Mr. T. Sten replaced Mr. Kelly as a representative of the Rottnest Board, I took Professor Waring's place, and in September, 1958, Mr. R. W. George was appointed to represent the W.A. Museum. The Committee meets quarterly. One meeting a year is held at the Station.

When they were first leased the buildings were little more than shells and, although in fair condition, had had no maintenance since they were vacated after World War II. Even before the lease had been formally signed parties of volunteers had started to put the building in order, to paint them outside and to install essential furnishings and fittings. Since then a great deal has been done to maintain and improve the buildings, much of it by the voluntary labour of those using the Station, their

friends and relatives, those attending annual student camps, and by some of the technical staff of the University who have spent part of their holidays at the Station. Officers of the State Department of Fisheries have assisted also.

Rottnest Island is a Reserve for recreation, and is under the control of the Rottnest Island Board. It is primarily a holiday resort and each summer large numbers of visitors occupy the bungalows of the settlement on Thompsons Bay. There is no private ownership of land and no private transport is allowed. Lack of transport would have severely handicapped work at the Station and permission of the Board was sought to use a vehicle. A second-hand Land Rover was purchased and transported to the Island in April, 1954, by the Army. It has recently been replaced with a new vehicle. Throughout the development of the Station we have had the friendly co-operation of the Board members, of its employees, and especially of its Secretary, Mr. Jim Stark. Good relations were cemented recently (February, 1959) when Board members and Island residents were entertained at the Station and told about research conducted on the Island by the Zoology Department. At the outset the Lighthouse Department helped with transport; throughout we have drawn on their supply of bore water, and successive Light Keepers have acted as caretakers to the Station.

All research projects are separately financed (through University Research Grants, C.S.I.R.O. Scholarships, Nuffield and Rockefeller Grants), and hence this is not a worry to the Committee, which has no funds directly at its disposal.

Development and maintenance have been financed by the participating organisations. On the recommendation of Mr. E. M. Barker, at that time Chairman of the Senate Finance Committee, the University made an initial grant for the purchase of the Land Rover, a small lighting plant and essential furnishing and now makes an annual maintenance grant. Annual grants from the State Fisheries Department have been used to provide floor coverings, for the recurrent expenditure on painting and for other outside facilities. C.S.I.R.O. has made available a 32/250 volt lighting plant and for two years supplied petrol to the Station. Mileage is charged for the use of the vehicle but at present no other Station charge is made.

From its inception the Station has been in frequent use. During 1954 the principal users were Sharman and Barker in their pioneer work on quokka biology. In 1955 and early 1956, Dunnet and his assistants spent much time there making population studies of the quokka. In 1957 and 1958, Shield and his team made repeated visits to conduct their studies of quokka nutrition. While these have been the regular users of the Station many others have made constant use of it for their investigations, as will be evident from succeeding articles. The first student camp was held in November, 1954, and since then undergraduate training has been a regular feature of the Station.

The Station has no resident staff; permanent facilities are at present limited to ordinary domestic requirements and a laboratory fitted with light, power and water, but to which equipment is brought from the mainland according to the needs of particular work. The proximity of the Station to Perth and the University and the accessibility of Rottnest by boat and aeroplane, has thus made it possible to conduct much valuable research at a relatively insignificant cost. The policy of the management committee is to facilitate in every way the academic study of fauna and flora and the study of economically

valuable organisms within the purview of State Fisheries and C.S.I.R.O. The concern of the Committee for the preservation of this unique habitat led to an approach to the Australian Academy of Science for funds to extend the fenced enclosures. A grant was made and two fences have been erected. In addition to workers from the sponsoring bodies, a number of visiting biologists have used the Station for short periods and it is hoped that more may be welcomed in the future.

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## 12.—Geology of Rottnest Island

### Introduction

Rottnest Island lies on the continental shelf along the western flank of the Perth Basin. It forms the northern termination of two parallel chains of low islands and shallow reefs that strike in a north-north-westerly direction from the vicinity of the mainland south of Perth. Both chains are composed mainly of Quaternary aeolianite and represent major series of calcareous sand dunes which formed close to the shore line when the sea-level was considerably lower than at present. The eastern chain consists of the Murray Reefs, Seal Island, Bird Island, Point Peron, Garden Island, Carnac Island and the Stragglers Reefs; the second chain lies approximately two miles to the west of the first and includes Coventry Reef, Hawley Shoal and Casuarina Shoal. Gravity surveys (Vening Meinesz 1948; Thyer and Everingham 1956) show Bouguer Anomalies of between -65 and -70 milligals in the vicinity of Rottnest Island and suggest that a thickness of about 20,000 feet of sedimentary rocks separates the surface exposures from the underlying crystalline basement complex.

Recent contributions to our knowledge of the geology of Rottnest Island have been made by Teichert (1950) and Fairbridge (1954). The present authors wish to acknowledge the valuable assistance of Mr. B. E. Balme, Dr. E. P. Hodgkin, Mr. P. E. Playford and Miss M. E. Redman in the compilation of this review. Two of us (C.W.H., E.W.S.K.) are currently engaged in a study of the geology of Rottnest Island.

### Succession

All rock exposures on Rottnest Island are thought to be of Quaternary age, but Tertiary and Cretaceous strata were penetrated in the Rottnest Island Bore. This bore was drilled near the Rottnest Cemetery at a surface elevation of approximately 10 feet above mean-sea-level. It reached a total depth of 2,582 feet. A Lower Cretaceous sequence of dark grey, sandy, glauconitic claystone and shale and dense sandstone was penetrated between 2,185 feet and 2,582 feet: this interval is correlated with the South Perth Formation, known from bores in the Perth Metropolitan Area. The overlying Kings Park

Shale is a marine formation which extends from 933 feet to 2,185 feet. It consists of impure sandstone, grey sandy shale, and thin beds of impure limestone. Numerous fragmentary invertebrates were recovered from the available cores. Spore and pollen studies confirm the correlation with the Middle to Upper Eocene Kings Park Shale of the Perth bores. Coarse-grained, red, brown and yellow sandstone occupies the interval between the base of the "Coastal Limestone" at 233 feet, and the top of the Kings Park Shale, at 933 feet. Samples of this part of the section are not available for study, but the unit may represent part of an ancient delta of the Swan River. A thin unnamed formation of late Tertiary or Pleistocene age occurs below the "Coastal Limestone" in the Public Works Department Swan River bores directly to the west of the Fremantle Traffic Bridge. It is perhaps of similar age and origin to the sandstone beneath the "Coastal Limestone" in the Rottnest Island Bore. Sandy limestone extends from the top of the unnamed sandstone formation, at 233 feet, to the surface of the bore.

The Rottnest Island Bore, which is the second deepest hole drilled in the Perth Basin, penetrated the thickest known section of the Kings Park Shale. Comparison of the depths of formations in the bores of the Perth area suggests that the Mesozoic and Tertiary sections in this area are faulted.

### Exposures

All lithified strata exposed on Rottnest Island are referred to the "Coastal Limestone." They consist predominantly of coarse-grained, cross-bedded aeolianite and include minor developments of marine limestone. Fossil soils of limited areal extent are fairly common in the cliff sections west of Narrow Neck.

The aeolianite of the "Coastal Limestone" is similar in composition to the sands on the present day beaches of the island. It is composed mainly of comminuted shells, calcareous algae, Foraminifera and other calcareous microfossils, but includes rounded quartz grains and minor amounts of heavy minerals. Quartz grains are